

Amendments to the Claims:

1. (Cancelled)

2. (Currently Amended) ~~Drive~~ The drive mechanism according to claim [[1]] 3, wherein:

the piston [[(4)]] is equipped on each of its face  
5 sides with the piston ~~one each~~ permanent magnet ~~(18, 19~~  
~~respectively)~~; and

~~where in each instance a~~ the stator permanent magnets  
~~(15, 16 respectively) be are~~ located in the area of ~~the~~ face  
sides of the cylinder [[(3)]].

3. (Currently Amended) ~~Drive~~ A reciprocating  
piston drive mechanism, ~~according to one of the claims 1 or 2,~~  
~~wherein: comprising:~~

a housing,

5 a cylinder defined in said housing,

~~the stator~~ permanent magnets ~~(15, 16) on the stator~~  
~~side are located~~ disposed in the cylinder[[ (13) ]], ~~and where~~

a piston mounted for back and forth movement in the  
cylinder, the face sides of the piston (4) are in each instance  
10 being equipped with recesses, which correspond to the dimensions  
of the stator permanent magnets ~~(15, 16)~~.

an electromagnetic drive for the piston including an  
electromagnet on a stator side and at least one permanent magnet  
on the piston,

15 the stator permanent magnets being disposed relative  
to the permanent magnet of the piston in such a way that the  
piston adopts a substantially centered axial position in an idle  
state on the stator side.

4. (Currently Amended) ~~Drive~~ A reciprocating  
piston drive mechanism ~~according to claims 1 to 3, wherein on~~  
~~the stator side comprising:~~

a housing,

5 a cylinder defined in said housing,

a piston mounted for back and forth movement in the cylinder,

an electromagnetic drive for the piston including an electromagnet on a stator side and at least one permanent magnet  
10 on the piston,

stator permanent magnets disposed on the stator side and disposed relative to the permanent magnet of the piston in such a way that the piston adopts a substantially centered axial position in an idle state,

15 a pole component (yoke) (11) be provided with a cross section having a U-shape and the U-limbs of which end at the a level of the permanent magnets (15, 16) on the stator side.

5. (Currently Amended) ~~Drive~~ The drive mechanism according to claim 4, wherein the U-shaped pole component ~~[[ (11) ]]~~ encompasses at least one or several coils (8, 8', 8'') coil from three sides.

6. (Currently Amended) ~~Drive~~ The drive mechanism according to claim 5, wherein ~~there is located between the coil(s) and the cylinder (3)~~ a further cylindrical pole component ~~(12) shaped approximately like a pipe section is~~  
5 located between the coil and the cylinder.

7. (Currently Amended) ~~Drive~~ The drive mechanism according to ~~one of the above claims~~ claim 4, wherein axially arranged pole components ~~(21 to 24) be~~ are assigned to the permanent magnets ~~(18, 19)~~ at the piston ~~[[ (4) ]]~~.

8. (Currently Amended) ~~Drive~~ A reciprocating piston drive mechanism according to ~~claim 1 or 2,~~ wherein comprising:

a housing,  
5 a piston mounted for back and forth movement in a cylinder, the piston ~~is being~~ equipped only with a single permanent magnet ~~[(20)]~~ situated approximately centrally in ~~the~~ an axial direction.

10     an electromagnet on a stator which interacts with the  
permanent magnet on the piston to drive the piston,

stator permanent magnets disposed on the stator and  
disposed relative to the permanent magnet of the piston in such  
a way that the piston is biased toward a substantially centered  
axial position in an idle state.

9.     (Currently Amended) ~~Drive~~ The drive mechanism  
according to claim 8, wherein ~~there is located one each~~  
permanent magnets ~~(15, 16)~~ on the stator ~~side at the~~ are located  
on opposite sides of the permanent magnet ~~(20) on the side~~ of  
5     the piston, ~~and where the~~ a distance ~~[[of]]~~ between the  
permanent magnets ~~(15, 16)~~ on the stator ~~side~~ corresponds to ~~the~~  
an amplitude of the piston's motion.

10.    (Currently Amended) ~~Drive~~ The drive mechanism  
according to claim 8 ~~[[or 9]]~~, wherein:

two coils ~~(8', 8'')~~ are provided ~~the axial direction~~  
next to each other along the axial direction,

5     ~~where~~ a yoke [(11)] encompasses the coils,  
~~where the~~ a face side of a central yoke component  
[(11')] encompasses the permanent magnet ~~(20) on the side~~ of the  
piston, and

10    ~~where the~~ face sides of ~~the~~ inner axially extending  
yoke components rest ~~from the outside~~ against the permanent  
magnets ~~(15, 16)~~ on the stator ~~side~~.

11.    (Currently Amended) ~~Drive~~ A reciprocating  
piston drive mechanism ~~according to one of the claims 1 to 10,~~  
~~wherein it is of a~~ comprising:

5     a housing,  
a cylinder defined in said housing,  
a piston mounted for back and forth movement in the  
cylinder,

10    a rotationally symmetrical design and where the  
permanent magnets (15, 16, 18, 19, 20) are each of  
electromagnetic drive for the piston including an electromagnet

on a stator and at least one ring-shaped ~~design~~ permanent magnet on the piston,

15        stator permanent magnets disposed on the stator and disposed relative to the ring-shaped permanent magnet of the piston in such a way that the piston is biased to a preselected axial position in an idle state.

12.    (Currently Amended) ~~Drive~~ The drive mechanism according to ~~one of the claims~~ claim [[1 to]] 11, wherein the pole components and/or the magnetic forces are arranged, resp. selected to be stator includes axially symmetrical pole components.

13.    (Currently Amended) ~~Drive~~ A reciprocating piston drive mechanism according to one of the claims 1 to 11, wherein comprising:

5                a housing in which a cylinder is defined,  
                 a stator surrounding the cylinder,  
                 a piston mounted for back and forth movement in the cylinder,

10                an electromagnetic drive for the piston including an electromagnet, permanent magnets, and pole components in the stator and at least one permanent magnet on the piston, at least one of the pole components and/or the interacting with the stator magnets such that resultant magnetic forces are arranged, resp. selected to be axially asymmetrical,

15                the stator permanent magnets being disposed relative to the piston permanent magnet to bias the piston toward a substantially centered axial position in an idle state.

14.    (Currently Amended) ~~Drive~~ A reciprocating piston drive mechanism according to one of the above claims, wherein it is equipped with comprising:

5                a housing,  
                 a cylinder defined in said housing,  
                 a piston mounted for back and forth movement in the cylinder,

an electromagnetic drive for the piston including an  
electromagnet on a stator and at least one permanent magnet on  
10 the piston,

sensors ~~(31, 32)~~ for detecting the piston's position,  
stator permanent magnets disposed on the stator  
relative to the piston permanent magnet to urge the piston to  
adopt a substantially centered axial position in an idle state.

15. (Currently Amended) ~~Reciprocating A~~  
~~reciprocating piston vacuum pump with a~~ drive mechanism  
according to one of the claims 1 to 14, wherein comprising:

a housing,  
5 a cylinder defined in said housing,  
a piston mounted in the cylinder for back and forth  
movement, the piston and the cylinder defining two chambers, at  
least one of the two chambers ~~(34, 35)~~ created by the piston  
[[14]] and the cylinder ~~(3)~~ be being equipped with an inlet  
10 valve and a discharge valve,

an electromagnetic drive for the piston including a  
stator electromagnet and at least one piston permanent magnet,  
stator permanent magnets disposed relative to the  
piston permanent magnet for biasing the piston to a  
15 substantially center axial position.

16. (Currently Amended) ~~Pump A~~ reciprocating piston  
vacuum pump according to claim 15, wherein comprising:

a housing;  
a cylinder defined in the housing;  
5 a piston mounted in the cylinder, the piston and  
cylinder defining a pair of chambers on opposite sides of the  
piston, the piston mounted for reciprocating movement in the  
cylinder, which reciprocating movement expands one of the  
chambers as it contracts the other;  
10 an inlet line [[36]] opening ~~at the outlet side~~  
into at least one of the chambers, the opening of said inlet  
line forming together with the piston [[4]] an inlet valve,  
at least one permanent magnet mounted on the piston;

15       permanent magnets mounted on a stator such that  
magnetic forces between the stator permanent magnets and the  
piston permanent magnet urge the piston toward a substantially  
central axial position; and,

20       an electromagnet on the stator for selectively urging  
the permanent magnet on the piston to move the piston along the  
cylinder.

17.    (Currently Amended) ~~Pump~~ A reciprocating piston  
pump according to claim 15 or 16, wherein pressure or piston  
controlled comprising:

5       a housing;

a cylinder defined in the housing;

a piston mounted in the cylinder, the piston and  
cylinder defining a pair of chambers on opposite sides of the  
piston, the piston mounted for reciprocating movement in the  
cylinder, which reciprocating movement expands one of the  
10   chambers as it contracts the other;

discharge valves (41, 42) are provided which are  
controlled by one of pressure and the piston,

at least one permanent magnet mounted to a piston;

15       permanent magnets mounted on a stator such that  
magnetic forces between the stator permanent magnets and the  
piston permanent magnet bias the piston toward a substantially  
centered position axially; and,

20       an electromagnet on the stator for selectively urging  
the permanent magnet on the piston to reciprocate the piston in  
the cylinder.

18.    (Currently Amended) ~~Pump~~ The pump according to  
claim 17 wherein the discharge valves include closure pieces  
(43, 44) of the discharge valves (41, 42) are designed as discs  
and which extend substantially over the entire cross section of  
5   the cylinder [(3)].

19. (Currently Amended) ~~Pump~~ The pump according to claim 18, wherein ~~the~~ closing motion of the closure pieces ~~discs~~ ~~(43, 44)~~ is ~~effected~~ assisted by the resilient forces of springs.

20. (Currently Amended) ~~Pump~~ The pump according to claim 18, wherein ~~the~~ closing motion of the closure pieces ~~discs~~ ~~(43, 44)~~ is ~~effected~~ assisted by the magnetic forces.

21. (Currently Amended) ~~Pump~~ The pump according to claim 20, wherein:

the ~~discs~~ ~~(43, 44)~~ are closure pieces include discs made at least partly of a ferromagnetic material; and  
5        ~~where the~~ an outer face side of one of the permanent magnets ~~(15, 16, 15', 16')~~ on the stator ~~side~~ forms ~~the~~ a discharge valve seat.

22. (Currently Amended) ~~Pump~~ A reciprocating piston drive mechanism ~~according to one of the claims 15 to 21, wherein one or comprising:~~

a housing;  
5        several cylinders/~~piston pairs~~ ~~(3, 4, 3' 4')~~ are accommodated in the housing [[ (2) ]].

a piston mounted in each of the cylinders, the pistons and cylinders defining pairs of chambers on opposite sides of each piston, each piston being mounted for  
10 reciprocating movement in a corresponding one of the cylinders, which reciprocating movement expands one of the chambers as it contracts the other;

at least one permanent magnet mounted on each piston;  
permanent magnets mounted on a stator such that  
15 magnetic forces between the stator permanent magnets and the piston permanent magnets urge the pistons toward selected axial positions; and,

an electromagnet on the stator for selectively reciprocating each piston along the corresponding cylinder.

23. (Currently Amended) ~~Drive~~ A drive mechanism or pump according to one of the above claims wherein one or comprising:

a housing;

5 a cylinder defined in the housing;

a piston mounted in the cylinder, the piston and cylinder defining a pair of chambers on opposite sides of the piston, the piston mounted for reciprocating movement in the cylinder, which reciprocating movement expands one of the  
10 chambers as it contracts the other;

at least one permanent magnet mounted on the piston;

permanent magnets mounted on a stator such that magnetic forces between the stator permanent magnets and the piston permanent magnet bias the piston;

15 an electromagnet on the stator for selectively urging the permanent magnet on the piston to move the piston along the cylinder; and,

a switching means (63, 66, 67) for driving the electromagnet coil (2, 8, 8', 8'') are provided, said switching  
20 means being driven by sensors (31, 32) or other signals dependent on the piston's position.

24. (Currently Amended) Method A method for operating ~~a pump or~~ a drive mechanism according to claim 13, wherein at least one of a ~~the~~ frequency of the piston's motion and/or ~~the~~ a maximum current flow in the ~~coil(s)~~ electromagnet  
5 is pre-set.

25. (Currently Amended) Method The method according to claim 24 wherein the piston motion is reversed ~~already~~ before reaching the an end position of travel.

26. (Currently Amended) ~~Method according to claim 24 or 25~~ A method for operating a ~~pump drive mechanism~~ according to claim 22, wherein ~~the related drive mechanisms are so controlled, that the pairs of~~ the pistons ~~(4, 4') will are~~  
5 controlled to reciprocate in opposite directions.



27. (Currently Amended) ~~Piston~~ A piston for a reciprocating piston ~~pump drive mechanism~~ according to ~~one of the claims claim 15 to 22, wherein it is composed of, the piston including:~~ two pot components (70, 71) which in the an area of  
5 their open face sides are equipped with joining means (72, 73).

28. (Currently Amended) ~~Piston~~ The piston according to claim 27 ~~for a pump according to one of the claims 8 to 10,~~ wherein the pot components (70, 71) are equipped in the area of their open face sides with rims (74, 75) which in the  
5 assembled state form a ring groove [[(76)]] for accepting ~~the~~ a single permanent magnet ring [[(20)]].